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Notes:

1. Untranslatable words are replaced with asterisks (***).
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FULL CONTENTS

[Claim(s)]

[Claim 1] The individual lead electrode which connects to two or more heating element and each heating element the driver IC who carries out an energization drive, and these, In the thermal head which consists of the voltage feed end child prepared in order to supply the voltage from a power supply to the common electrode wiring connected common to each heating element, and this common electrode wiring The thermal head characterized by changing either [at least] the resistance of a heating element, or the resistance of an individual lead electrode so that it may become a big value as the place near this voltage feed end child linked to this common electrode wiring.

[Claim 2] The thermal head of Claim 1 characterized by not connecting with 1 or two or more terminals corresponding to the place near the voltage feed end child who connects with said common electrode wiring among two or more grand contact buttons of said driver IC.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the thermal head used, for example with printing equipment, such as a facsimile and a printer.

[0002]

[Description of the Prior Art] The circuit of the thermal head is constituted by heating element resistance and the driver IC who carries out on-off control of it individually, heating element resistance of these plurality and Driver IC are connected with an individual lead electrode, and common electrode wiring is further connected to each heating element. In addition, there is a resisted part in the individual lead electrode of each heating element, and common electrode wiring in fact, and there is a resisted part also in the grand electrode wiring currently similarly

wired inside driver IC.

[0003] A thermal head supplies the voltage from a power supply to common electrode wiring from a voltage feed end child, and when Driver IC is driven alternatively and it turns ON, a heating element will drive alternatively and will generate heat. Thus, it prints by making a heating element generate heat alternatively, and making a paper transfer an ink ribbon with this heat, or making a thermal paper color directly.

[0004] In order to change with the temperature of a heating element and to lose concentration spots, printing concentration must be controlled so that the temperature of each heating element becomes uniform. Therefore, the heating element and the individual lead electrode are made so that the resistance may become as uniform as possible, and resistance of common electrode wiring is designed to become as small as possible, and he is trying, as for the grand electrode of Driver IC, to arrange as many external connection terminals as possible.

[0005]

[Problem to be solved by the invention] By the way, as a recent trend of a thermal head, a spur starts a miniaturization and low-pricing and size is becoming small very much. Therefore, the field of common electrode wiring will not be able to take widely, but the amount of quite strong wiring resistance as a result will exist. Therefore, the voltage drop in this portion happens and concentration spots occur as a result. Although lowering wiring resistance by constructing a thick film conductor etc. into a common electrode wiring portion as a method of preventing this is performed, it becomes the cause of a cost rise. Moreover, a thermal head is carried also in a portable device in recent years, and is driven also by a battery. Since such a thermal head is driven on low voltage, in order to obtain sufficient electric power, its exothermic resistance must be small and it becomes easy to generate the concentration spots by a resisted part of the electrode mentioned already. This invention aims at offering a thermal head without concentration spots, without being devised in view of such a point and taking complicated composition and structure.

[0006]

[Means for solving problem] In order to solve an above-mentioned problem, it sets to this invention. [resistance] while changing at least one resistance of an individual lead electrode and the heating elements so that it may become a big value as the place near the voltage feed end child of common electrode wiring By not connecting the portion corresponding to the place near the voltage feed end child who connects with said common electrode wiring among two or more grand contact buttons of Driver IC, calorific value in a heating element is made uniform, and the concentration spots at the time of printing were lost.

[0007]

[Mode for carrying out the invention] The form of operation of this invention is explained in full

detail hereafter. Drawing 1 is the top view of the thermal head of this invention. As shown in drawing 1, a thermal head has the wiring board 5 with the head chip in which the layer of a heating element 2, the individual lead electrode 3, and the common electrode wiring 4 was formed. Various layers are formed on the ceramic substrate 1, and a head chip is constituted. First, on the ceramic substrate 1, the Gleizes layer which consists of the glass system quality of the material which has the function of a heat insulating layer is formed. On the Gleizes layer, the longitudinal direction is covered and the heating element 2 is continuously formed at intervals of predetermined. Moreover, the individual lead electrode 3 or the common electrode wiring 4 which consists of metal, such as aluminum, is formed so that the end of the right-and-left-among figure both sides of each heating element 2 may be contacted. Furthermore, a protective film is formed in the upper part of a heating element 2.

[0008] The connection structure with each heating element 2, the individual lead electrode 3, or the common electrode wiring 4 in such a thermal head is classified into two kinds. One side is a common electrode type which has common electrode wiring in the end side where each heating element of a ceramic substrate is arranged. By this type, the individual lead electrode from each heating element corresponding to each printing dot is prolonged to the other end of a ceramic substrate, and the drawer wiring from the both ends of a common electrode is also installed to the other end of a ceramic substrate by it. Another side is what is called a U-turn electrode type. Namely, while having a pair of two heating elements corresponding to each printing dot and connecting the end parts of these heating elements by U character-like wiring. One heating element is connected to the individual lead electrode prolonged to the end of a ceramic substrate, and the heating element of another side is connected to the common electrode wiring prepared in the end of the ceramic substrate. And in any case, it connects with common electrode wiring through a voltage feed end child, and voltage is alternatively impressed to the lead electrode classified by each through IC chip.

[0009] Here, a U-turn electrode type is explained to an example. Each heating element 2 consists of a pair of two heating elements, as shown in drawing 1, and the electrode which consists of a thin film layer of aluminum etc. is connected to each both ends of each heating element 2. As for one heating element, the individual lead electrode 3 is connected to the right end part. Moreover, a right end part is connected to the common electrode wiring 4, and another heating element is connected to the voltage feed end child prepared in the end by the side of opposite in the heating element 2 of the ceramic substrate 1. Furthermore, each left end part of a pair of heating elements 2 is connected by U character-like wiring with the electrode.

[0010] On the other hand, the wiring boards 5 are circuit boards, such as a GARAPO board, and driver IC6, the grand contact button 7, and the voltage feed end child 8 are formed on this substrate. Driver IC6 are a driver which outputs the drive signal for making each heating

element 2 mentioned above generate heat alternatively, and they are prepared for every physical predetermined block by the number of the heating elements which can be driven. In addition to this, the terminal of control signal supply exists in driver IC6 in fact with the portion and the grand contact button 7 linked to the individual lead electrode 3. Moreover, the voltage feed end child 8 is for impressing voltage to a heating element 2. Each terminal of these driver IC6 is connected with the individual lead electrode 3 and the grand contact button 7 which were mentioned above by the bonding wire, respectively. Moreover, the common electrode wiring 4 is connected to the direct voltage feed end child 8 without driver IC6. In addition, the mold of driver IC6 and the bonding wire is carried out with closure resin.

[0011] When a driver is simultaneously turned on as they are the above composition, the current which flows into the common electrode wiring 4 becomes size, and the voltage drop by resistance of this portion becomes large. At this time, a voltage drop becomes large as a place distant from a part for the terminal area of the common electrode wiring 4 and the voltage feed end child 8, it becomes electric power loss as a result, the difference of the power consumption in a heating element 2 will arise, and concentration spots occur. The difference of electric power loss in 1 physics block in driver IC6 which can drive the heating element of 64 to drawing 2 is shown.

[0012] Although the resistance of a heating element 2 and the resistance of the individual lead electrode 3 are completely uniform, compared with both ends, the thing with central large electric power loss is based on the voltage drop of the common electrode wiring 4, but the part by the voltage drop of the grand electrode wiring currently wired inside driver IC6 is also added. In order to improve this, at least one resistance of the resistance of a heating element 2 or the resistance of the individual lead electrode 3 was made into the small value as the place distant from a part for the terminal area of the common electrode wiring 4 and the voltage feed end child 8, and it was made to change in a conversely near place, in this invention, so that it may become large. Although asking correctly by calculation is desirable, the quantity to change does not necessarily need to be uniform at all calculatively, and if the variation in the power consumption of a heating element is improved relatively, it is satisfactory practically.

[0013] By the way, when changing the resistance of a heating element 2, or the resistance of the individual lead electrode 3, it is necessary to change the form of a heating element 2 or to change the length or width of the individual lead electrode 3, and you have to increase the amount of change, so that the resistance of a heating element 2 becomes small. At this time, when the amount of change is very large, it may be difficult to make it change substantially. So, in addition in this invention, it was made not to connect the portion corresponding to the place near the voltage feed end child 8 of said common electrode wiring 4 among two or more grand contact buttons 7 of driver IC6. Like drawing 1, there are two or more contact buttons, as for it, it is desirable that it is numerous, and, as for the grand contact button 7 of driver IC6,

it is common to connect with an external connection terminal altogether moreover so that the voltage drop within driver IC6 may not occur. However, in this invention, operation of in addition being made not to connect the portion corresponding to the place near the voltage feed end child 8 of the common electrode wiring 4 is performed as mentioned above. As resistance of the place near the voltage feed end child 8 of the common electrode wiring 4 became large substantially, it was made for the calorific value of each heating element to become uniform.

[0014] The example which has improved electric power loss by this operation in driver IC6 in which per 1 physics block in every driver IC6 has eight grand contact buttons 7 by 64 dots is shown in drawing 3 by the case where resistance of a heating element 2 is 100ohms. First, by this example, the resistance of the individual lead electrode 3 is changed so that it may become a big value as the place near the voltage feed end child 8 of the common electrode wiring 4. Furthermore, what did not connect two both ends but connected only six inner sides is compared with the time of connecting altogether the grand contact button 7 existing [eight], and it is shown. Although about 5.1% of the difference of the maximum in a physical block when eight connect altogether, and the minimum exists, when not connecting two both ends, the difference of maximum and the minimum improves to about 3.4%.

[0015] [in changing the resistance of a heating element 2, or the resistance of the individual lead electrode 3, are making it change in the example of drawing 3 , so that it may become a big value simply as the place near the voltage feed end child 8 of the common electrode wiring 4, but] If the large place of electric power loss makes resistance small further and the small place of electric power loss enlarges resistance further, it cannot be overemphasized that an improvement effect increases.

[0016] In the embodiment mentioned above, although connection of what is called a U-turn electrode type was described, it is applicable also to connection of the type which has common electrode wiring in the end side where each heating element is arranged. That is, this invention is applicable by preparing two or more connections with the external terminal of the common electrode wiring prepared in the heating element side besides the both ends of common electrode wiring.

[0017]

[Effect of the Invention] Since the exothermic difference of the heating element in the part distant from there near the voltage feed end child of common electrode wiring can be abolished according to this invention when two or more heating elements drive simultaneously as stated above, the concentration spots when printing can be lost. In particular, it is a thermal head and the good thing of print quality without concentration spots can be offered also to what has the small resistance of the heating element used with the portable device which carries out a battery drive when many heating element resistance which outputs a picture, for example is

turned on simultaneously. And reducing the connection number of common electrode wiring contributes also to reduction in a man day.

[Brief Description of the Drawings]

[Drawing 1] It is the top view of the thermal head by this invention.

[Drawing 2] It is the example of electric power Ross of the conventional thermal head.

[Drawing 3] It is the example of an improvement of electric power Ross of the thermal head by this invention.

[Explanations of letters or numerals]

1 Ceramic Substrate

2 Heating Element

3 Individual Lead Electrode

4 Common Electrode Wiring

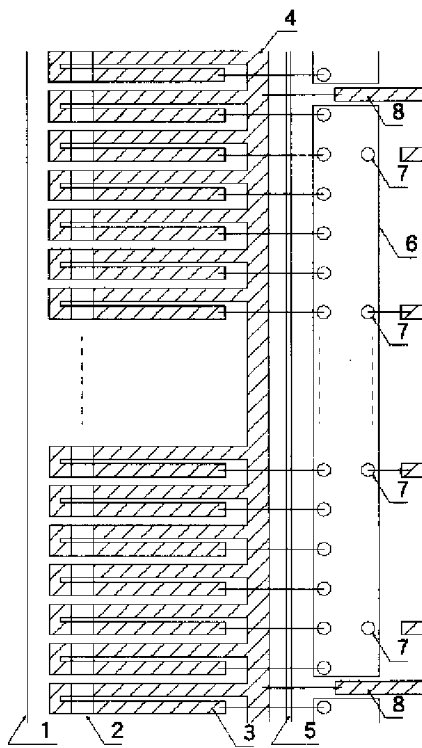
5 Wiring Board

6 Driver IC

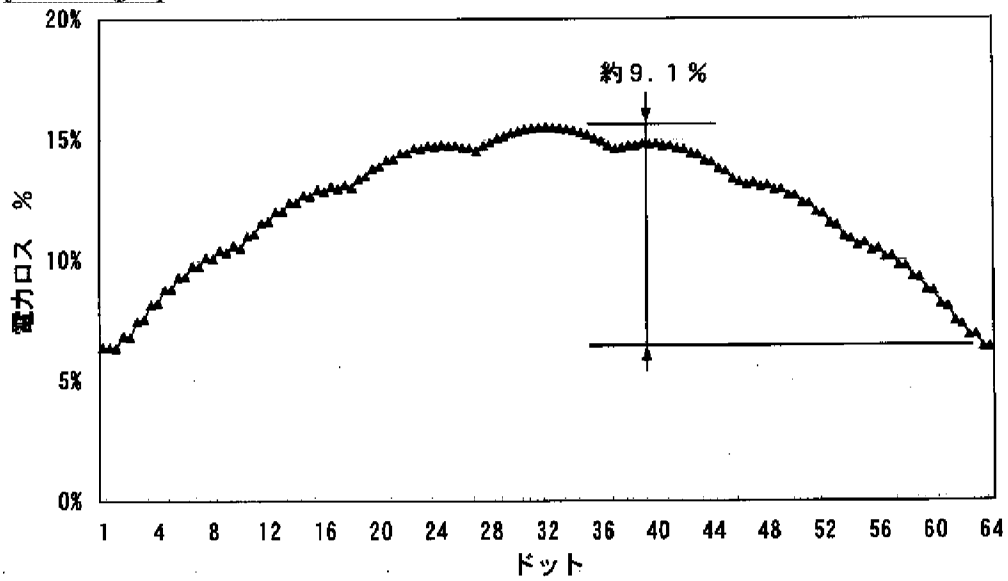
7 Grand Contact Button

8 Voltage Feed End Child

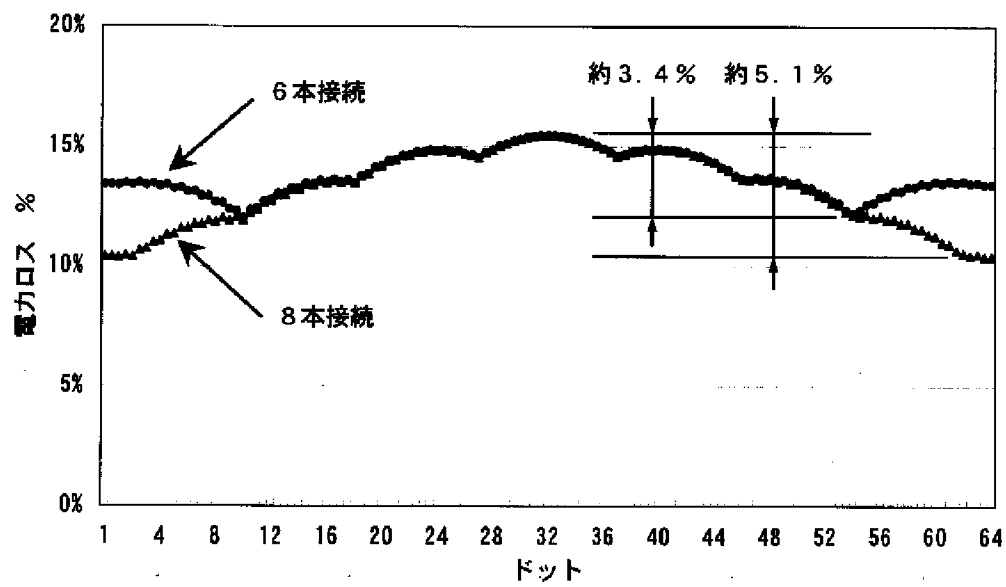
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]